Cultural Transmission, Discrimination and Peer Effects*

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Abstract

Workers can have *good* or *bad* work habits. These traits are transmitted from one generation to the next through a learning and imitation process which depends on parents' investment on the trait and the social environment where children live. We show that, if a high enough proportion of employers have taste-based prejudices against minority workers, their prejudices are always self-fulfilled in steady state. Affirmative Action improves the welfare of minorities whereas integration is beneficial to minority workers but detrimental to workers from the majority group. If Affirmative Action quotas are high enough or integration is strong enough, employers' negative stereotypes cannot be sustained in steady-state.

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1 Introduction

According to a survey conducted in Chicago in 1988, one of the main reasons employers are not willing to hire inner-city black workers is the lack of basic skills and work ethics. As a suburban employer in Chicago put it, "The experiences that I've run into with it is that they develop bad habits, I guess is the best way to put it. Not showing up to work on time. Not showing up to work. *Somewhere down the road they didn't develop good work habits.*"[1]

This is consistent with more general evidence from sociology and anthropology[2] suggesting the existence of a persistent "ghetto culture", which is transmitted across generations. The existence of a low work ethic has been pointed out by several scholars as an important element in the set of values defining the prevalent culture in inner-city neighborhoods. These values are in sharp contrast with mainstream American society's working values rooted in the Protestant tradition. As argued by Wilson, it is the social, rather than the physical distance, that often separates poor workers from good jobs. This is particularly true for the African American community, which has experienced high levels of segregation for at least a century (Massey and Denton, 1993, Cutler et al., 1999).

> "Inner-city social isolation also generates behavior not conducive to good work histories. The patterns of behavior that are associated with a life of casual work (tardiness and absenteeism) are quite different from those that accompany a life of regular or steady work (e.g. the habit of waking up early in the morning to a ringing alarm clock). ... in neighborhoods in which most families do not have a steadily employed breadwinner, the norms and behavior patterns associated with steady work compete with those associated with casual or infrequent work." (Wilson, 1996)

In the words of a counsellor to a training program aiming at exposing workers to more conventional working values:

> "To adopt a regular pattern you have to break with this environment. Your friends laugh at you for going to work, that's hell, they think you are trying to be better than them! You have to have strong character to resist this pressure. If all your friends and

[1] See Wilson (1996) pages 119-120. Italics are ours.

[2] See, in particular, Hannerz (1969), Lewis, (1969), Wilson (1987), Lemman (1991) and Katz (1993).

families went to work they would help you adopt a regular schedule." (cited in Bonney, 1975)[3]

Why do some groups perform worse in the labor market than others? Several explanations have been put forward in the economics literature. In taste-based models (Becker, 1957), discrimination originates from employers' willingness to reduce profits to avoid hiring workers they are prejudiced against. Those workers will only be hired at lower salaries. The statistical discrimination theory, on the other hand, stresses the role of employers' beliefs concerning the *average* quality of workers from different groups. A member of the disadvantaged group will be discriminated against if the employer believes she is less qualified or reliable than a worker from other groups (see, e.g. Phelps, 1972, Arrow, 1973, Coate and Loury, 1993). In these models, negative stereotypes are self-fulfilling since discriminated workers become less productive as a result of the negative expectations held by the employers. More recently, it has been argued that the existence of community (or peer) effects can explain the poor performance of some workers. In absence of interaction between communities, some groups, due to interaction with poorly performing peers, end up with lower levels of education and adverse labor market outcomes (see, e.g. Arnott and Rowse, 1987, De Bartoleme, 1990, and Benabou, 1993).[4]

Other aspects, like work habits,[5] can also explained the different performances between workers from different communities. These traits, which affect individual performance in the workplace, are influenced by parents and peers.[6] Evidence from the sociological literature suggests that children's families and the communities where they live are important elements in shaping their attitudes towards work. Employers are reluctant to hire some workers because the prevalent values in their communities may negatively affect the incentives of

[3] This is related to the idea of "acting white" where economic success of blacks induces peers' rejection (Austen-Smith and Fryer, 2005)

[4] For a general overview of the issue of race in the labor market, see Altonji and Blank (1999) and Lundberg and Startz (2000).

[5] "Work habit" can be measured by a person's willingness to be unemployed, collect welfare, avoid shirking, or work long hours.

[6] Mulligan (1996) shows that a child of parents who do not work and/or collect government benefits for not working displays a tendency to behave similarly as an adult. Kohn (1969) concludes that parents generalize their experiences on the job and pass them to their children. More recently, Osborne Groves (2005) suggest that intergenerational transmission of personality may be a channel to explain intergenerational persistence of income.

parents to transmit the right habits. Policies promoting integration may, on the contrary, have a positive effect via parents investments.

We model the formation of "work-habit" traits using a mechanism that interacts purposeful socialization decisions inside the family (*direct vertical socialization*) and indirect socialization processes via peer effects and social interactions (*oblique* and *horizontal socialization*). Indeed, based on some works on anthropology and sociology (see in particular Boyd and Richerson, 1985, Cavalli-Sforza and Feldman, 1981), there is a recent literature initiated by the seminal papers of Bisin and Verdier (2000, 2001)[7] arguing that the transmission of a particular trait (religion, ethnicity, social status, etc.) is the outcome of a socialization inside and outside the family (like e.g. peers and role models). These two types of socialization are cultural substitutes (complements) if parents have less (more) incentive to socialize their children the more widely dominant their values are in the population.[8] In our model, we assume that parents are forward looking and invest resources in order to prepare their children for their future working experiences. Parents' efforts and children's preferences are also affected by the environment where children interact.

Workers belong either the majority group or the minority group. All individuals are born equal but, depending on the parents' investments and the social environment where they live, they acquire either a *good* (g) or a *bad* (b) work habit (absenteeism, tardiness, low reliability...). When deciding how much effort to exert on shaping their children's attitudes towards work, parents must form expectations about the working opportunities their children are going to face in the future.

We assume that each worker is randomly matched to an employer who has to assign the worker to a job. Employers know the group a worker belongs to but cannot perfectly observe her type. A proportion of employers may be taste-based prejudiced against minority workers and do not want to employ them. All other employers (imperfectly) screen the workers and employ them if they seem to have good working habits. This second group of employers are profit maximizers. The different treatment the workers are subject to creates a discrepancy in expected value in the market of the good trait for the two groups.

We first focus on a segregated society and show that, if the fraction of prejudiced em-

[7] Bisin and Verdier (2011) provide a very complete overview of this literature.

[8] Bisin et al. (2004), Cohen Zada (2006), Jellal and Wolff (2002), and Patacchini and Zenou (2011) provide empirical studies of cultural transmission and socialization of, respectively, religious traits, altruism, and preferences for education.

ployers is high enough and the peer group bad enough, their beliefs are self-fulfilled. Indeed, in steady-state, all minority workers end up with *bad work habits* and the profit maximizing strategy is not to employ them. Due to the adverse opportunities their children are going to face, parents do not find worthwhile exerting effort to transmit "good" values. As a result, more workers have bad work habits. This, in turn, influences members of the next generations in the same community and the initial negative beliefs are confirmed in steady state.

We then study the effect of different policies aiming at weakening this "ghetto" culture, which perpetuates bad working habits.

We first analyze Affirmative Action programs consisting in (i) imposing a quota of the discriminated group in *good* jobs, (ii) a quota of workers of the discriminated group who are treated as the workers of the other group. Under certain conditions, we show that the first policy has a negative long run effect while the second does improve the welfare. If the Affirmative Action imposes high enough quotas, negative beliefs cannot be sustained in steady state and all workers develop better work habits.

We then analyze the effect of integration policies. In this case, children are to some degree influenced by peers from both groups. We show that integration is beneficial for the workers who come from the worst peer group and detrimental for the others. This result helps us to understand why the latter may have an incentive to resist integration and may be reluctant to accept social mixing.

2 Related literature

Our model is related to the literature on statistical discrimination and cultural transmission since it combines elements of both literatures. However, there are important differences that we would like to highlight. First, compared to the statistical discrimination literature (especially Coate and Loury, 1993), in our model, there is no statistical discrimination, only racial discrimination a la Becker (1957). As a result, the mechanisms that drive the results are very different. In Coate and Loury (1993), minority workers do not invest enough in human capital because employers do not value their performance at their "real" value since they statistically discriminate them. On the contrary, in our model, it is the parents' expectation that plays a crucial role since they will put effort in "educating" their kids if

they believe that the future income of their offsprings will be high enough. As a complement or a substitute, the quality of the neighborhood and thus of the peers also play a decisive role on kids' future outcomes because they influence the possibility to have a good or bad work habit. Observe also that our model is dynamic while that of Coate and Loury (and most of the statistical discrimination literature) is static. Introducing dynamics in their model will lead firms to discover the real value of workers' productivity and thus, in the long run, statistical discrimination as well as employment and wage differences between minority and majority workers would disappear. This is not what we observe in the real world. On the contrary, in our model, the outcomes differences persist in the long run because of parents' different expectations and different neighborhood quality. Second, even though we use the cultural transmission model of Bisin and Verdier (2000, 2001), there are differences between our model and theirs. First, in their model, each parent value *her own trait most*, which makes sense in the context of religion, for example. Catholic parents prefer their children to be catholic rather than another religion, Muslim parents prefer their children to be Muslim, etc. In our model, this is not true anymore. All parents value *the same trait most*, that is the trait "good work habit". In other words, parents with bad work habits will still try to put some effort for their children to adopt the good work habit trait. This is has very important consequence for the steady-state equilibrium analysis. If one keeps the assumption of Bisin and Verdier (which does not make much sense in our context), then it has to be that, at any steady-state equilibrium, all parents (with good or bad work habits) will provide exactly the same socialization effort. This is, of course, not true anymore in our model since, in general, parents with good work habits tend to put more effort in transmitting the trait "good work habit" than those who have bad work habits. Second, we introduce frequency-dependent bias meeting process while, in the standard framework of Bisin and Verdier, it is an unbiased meeting process. In other words, if the socialization decision inside the family (*direct vertical socialization*) does not work then kids are influenced by an indirect socialization processes via peer effects and social interactions (*oblique* and *horizontal socialization*), which, in the unbiased case, means that the chance to adopt a trait is just equal to the fraction of people living in the neighborhood having that trait (random matching). This is in fact a particular case of our model. We consider a more general framework where the probability of adopting a certain trait can be increasing or decreasing with the fraction of people having the trait in the neighborhood. This is has also important consequences for the dynamics of the model.

If, for example, there were no income gain in having good work habits, with an unbiased meeting process, any value of q (i.e. the fraction of individuals having the "good" trait) could be a steady-state equilibrium while, with a frequency-dependent bias meeting process, only two stable equilibria emerge, either $q^* = 0$ or $q^* = 1$.

Our model is also related to a recent literature that investigates the effects of culture on labor outcomes. Focusing on Switzerland, Brügger et al. (2009) study how unemployment is affected by differences in culturally determined attitudes towards work within a narrowly defined geographic area. Their findings indicate that differences in culture explain differences in unemployment duration on the order of 20 percent. Algan and Cahuc (2005) and Alesina and Giuliano (2010) also investigate the role of "family culture" on labor market outcomes. These studies find that strong family ties reduce labor force participation. Ichino and Maggi (2000) study cultural differences in the propensity to shirk (absenteeism and misconduct) using data from a large Italian bank. They also find strong effects.[9] Other empirical studies have looked at the role of culture in explaining how social norms affect unemployment outcomes. Stutzer and Lalive (2004) use a novel measure of social norm to work: The percentage of citizens in a community who voted in favor of a reduction of unemployment benefits in a Swiss referendum. They find that a one standard deviation increase in the strength of the social work norm translates, on average, into a reduction of unemployment duration by approximately eleven days. Using British data, Clark (2003) finds similar results: The unemployed's well-being is shown to be strongly positively correlated with reference group unemployment (at the regional, partner, or household level).[10]

Our main contribution to this literature is to propose a dynamic model that combines discrimination and cultural transmission that can explain why some (inner-city) neighborhoods are populated by people having bad working habits (the "ghetto culture" mentioned in the Introduction). In our framework, it is the result of a combination of discrimination, low investment in work ethic from parents and bad peers. We are also able to study two different policies, namely Affirmative Action and integration policy, and show how they affect the long-run outcomes of minority as well as majority workers.

[9] See Guiso et al. (2006) for an overview of this literature and an interesting discussion on how culture affects outcomes.

[10] There are also theoretical models studying the inpact of social norms on labor-market outcomes (Kolm 2005), crime (Glaeser et al., 1996; Patacchini and Zenou, 2012), and welfare state provisions (Lindbeck et al., 1999, 2003; Lindbeck and Nyberg, 2006).

3 The model

There is a continuum of workers who belong either to majority group ($k = M$) or to the minority group ($k = m$). Apart from an *observable* trait (for example the color of their skin), majority and minority workers are totally identical. There is also an *unobservable* trait that determines their behavior on the job. In particular, we assume that workers have either a "good" (g) or "bad" (b) work habit and are referred to as "good" and "bad" workers.

The employer can observe the group the worker belongs to (majority or minority) but not her type ("good" or "bad"). At each time t ($-\infty < t < \infty$), every active worker is randomly matched with an employer. The employer decides whether or not to hire this worker. If a worker of type i ($i = b, g$) is hired, the payoff to the principal is Π_i, whatever the group $k = m, M$ she belongs to. The payoff is 0 if the worker is not hired. We assume that $\Pi_g > 0 > \Pi_b$. Irrespective of their type, workers earn a wage $w > 0$ when hired and zero when unemployed.[11]

As stated in the introduction, we study the intergenerational transmission of work-habit traits using an overlapping generation model. The way this trait is transmitted is through an education and peer-imitation process that depends on parents' investment on the trait and the social environment where children live. The transmission of the trait is here modeled as a mechanism that interacts socialization *inside* the family (*vertical* socialization) with socialization *outside* the family (*oblique* socialization) via imitation and learning from peers and role models as in Bisin and Verdier (2000, 2001).

Children preferences are shaped, via education, by their parents since they care about their children's future wellbeing. We analyze the behavior of a group and assume first that children only meet peers from the same group (i.e. segregation).[12] We assume that teaching good work ethics is costly and that a parent chooses an education effort, τ, possibly zero, so that with a probability equal to the education effort, education will be successful and the child will have a good work ethic. Otherwise, the child remains naive, without the working trait, and is matched to a group of peers from which she learns and adopts the good trait with probability $f(q)$, where q is the proportion of "good" workers in the peer group. Let p be the probability that a child is socialized to trait g. Since there is continuum of agents, by the Law of Large Numbers, p also denotes the fraction of children who become g. We have

[11] Without loss of generality, we normalize the unemployment benefit to zero.

[12] In Section 4.2, we investigate the case of integration between minority and majority workers.

the following transition probability:

$$p = \tau + (1 - \tau) f(q) \tag{1}$$

The child will have a good work habit if her parent's education is successful (with probability τ) or if the parent is unsuccessful (this happens with probability $1 - \tau$) and she learns from "good" peers. Observe that $f(q)$ captures the process of oblique transmission by which the naive child is influenced by her peers.

We assume that the transmission function $f(q)$ is *frequency dependent*, namely naive children copy with disproportionately high probability the most common trait in society. This learning process may be the result of children evaluating the merit of the different working habits by its frequency in the population (see Sáez-Martí and Sjögren, 2008, for microfoundations). Formally, the oblique transmission function $f : [0,1] \to [0,1]$ is a twice continuously differentiable, increasing function with $f(0) = 0$, $f(1) = 1$, and with at most one $\widehat{q} \in (0,1)$ such that $f(\widehat{q}) = \widehat{q}$.

Three qualitatively different biases are discussed in the sociobiological literature (Boyd and Richerson, 1985):

(*a*) *Positive bias*: the probability that the naïve individual acquires the good work habit from her peers is always greater than if he had copied one role model at random, $f(q) > q$ for all $q \in (0,1)$; see Figure 1(a).

(*b*) *Negative bias*: the probability that the naïve individual acquires the good work habit from her peers is always lower than if he had copied one role model at random, $f(q) < q$ for all $q \in (0,1)$; see Figure 1(b).

(*c*) *Frequency-dependent bias*: when the frequency of the good work habit in the community is greater (smaller) than $\widehat{q}$, the probability that the naïve individual acquires the good work habit from her peers is increased (decreased) relative to the unbiased transmission, $f(q) \lesseqgtr q$ for $q \lesseqgtr \widehat{q}$, for some $\widehat{q} \in (0,1)$. "Pure" conformism corresponds to the case when $\widehat{q} = 1/2$ since, in that case, when "good" peers constitute less than 50 percent of the population, there is a negative bias while a positive bias emerges when "good" peers constitute more than 50 percent of the population; see Figure 1(c).

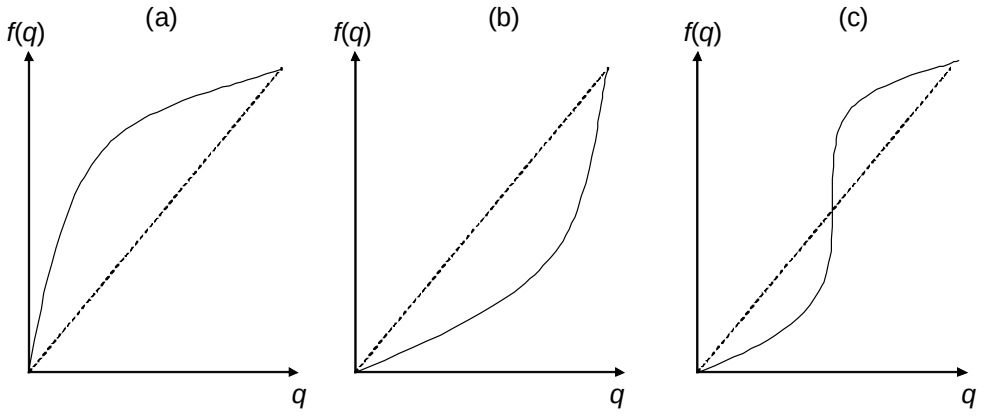

Figure 1: (a) Positive bias, (b) negative bias, (c) frequency-dependent bias.

Figure 2 displays three *frequency-dependent bias* transmission functions $f(q)$ that differ in the strength of the negative bias. The straight 45 degree line describes the oblique transmission function when it is linear, i.e. $f(q) = q$. In that case, the probability that children adopt the good work habit from their peers is exactly equal to the proportion of good workers in her neighborhood so that the peer transmission is *unbiased*. By comparing the dotted line with the thick straight line, one can see that $\widehat{q}$ is lower in the former than in the latter. A smaller $\widehat{q}$ implies that there is an additional bias in favor of the good working habit.

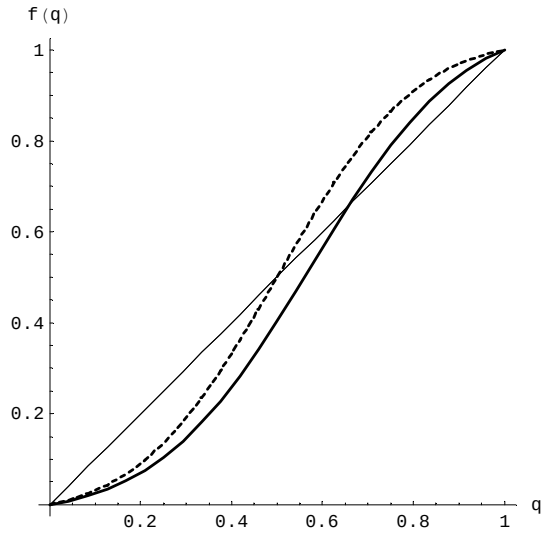

Figure 2: Different frequency-dependent bias transmission functions

In order to endogeneize the education effort, we need to analyze the employers' hiring behavior. We assume that each time an employer meets a *bad* worker she knows her type with probability α. With probability $1-\alpha$, she (wrongly) believes that the worker is *good*.[13] A *good* worker is never mistaken for a *bad* one. Our results are robust to the case of a more general signal technology, which allows for the mistaken classification of good workers as long as the probability to make a mistake on bad workers is larger that the probability to make a mistake on good ones. We assume that employers know the actual proportion q of *good* agents.

When the worker and the employer are matched, the employer chooses one of the two following strategies:[14]

Screening (ρ^s)*:* Hire only seemingly *good* workers, i.e. all *good* workers and some *bad* ones who have been (mistakenly) taken for *good* ones.

Pooling (ρ^p): Hire nobody.

Employers prefer strategy ρ^s to ρ^p if and only if:

$$q\Pi_g + (1-q)(1-\alpha)\Pi_b \geq 0$$

We can rewrite this inequality as follows:[15]

$$q \geq \frac{-(1-\alpha)\Pi_b}{\Pi_g - (1-\alpha)\Pi_b} \equiv \widetilde{q} \tag{2}$$

where $\widetilde{q} \in (0,1)$. If the proportion of *good* workers is high enough ($q > \widetilde{q}$), then screening is optimal. We denote the optimal strategy by μ :

$$\mu(q) = \begin{cases} \rho^s & \text{if } \ q \geq \widetilde{q} \\ \rho^p & \text{if } \ q < \widetilde{q} \end{cases} \tag{3}$$

[13] The probability α could be group dependent and written as α_k, for $k = m, M$. This extension would not change any of our results but will unnecessarily complicate the analysis.

[14] As in a previous version of the paper, we could have assumed that there were two tasks instead of two types of employment statuses like here. Task 1 is a more complicated and better-paid task while task 2 is a low-paid task. In that case, in the screening policy, the employer will offer task 1 to seemingly good workers while in, the pooling strategy, she will offer task 2 to everyone. The results will obviously be the same.

[15] Remember that $\Pi_b < 0$.

Let ρ_t be the employers' assignment strategy at time t when meeting a worker. We assume that a proportion $\theta \geq 0$ of the employers are *taste-based* prejudiced and never hire workers from the minority group, namely $\rho_t = \rho^p$ for all t, while a proportion $(1-\theta)$ of employers follow the optimal strategy, i.e. $\rho_t = \mu(q_t)$ at each t. The parameter θ, which may differ across groups, will explain differences in long-run outcomes. For individuals from the majority group, $\theta = 0$.

In order to compute the child's well-being at time t, a parent needs to form expectations concerning the child's future job opportunities. We assume that parents prefer their children to have those preferences which lead to decisions with higher expected income. This assumption departs from previous models in which parents use their own preferences to evaluate their children decisions (as in Bisin and Verdier, 2000, 2001, for example). A "job profile", from time $t+1$ onwards, is an (infinite) sequence $\{\rho_z\}_{z=t+1}^{\infty}$, with $\rho_z \in \{\rho^s, \rho^p\}$, for all z. We denote by π_t the expectations parents form at time t. We denote by ρ_{∞}^s, the infinite repetition of ρ^s and by ρ_{∞}^p, the infinite repetition of ρ^s. Let $V_i(\pi_t)$ be the expected earnings of a worker of type i when the expected job profile is π_t.

Note that when unemployed, *good* and *bad* workers have zero income. Under the screening assignment, *good* workers have higher expected earnings than *bad*. Let w be the wage when hired. Denote by λ the probability that an active worker in a given period will still be active the next period (see Section 4). Then

$$V_g(\rho_{\infty}^s) = \frac{w}{1-\lambda} \geq \frac{w(1-\alpha)}{1-\lambda} = V_b(\rho_{\infty}^s)$$

whenever $\alpha > 0$. Note that for any positive α, *good* workers have an expected income which is never smaller than that of *bad* workers. Then, $V_g(\pi_t) \geq V_b(\pi_t)$ for any π_t.

Let $C : [0,1] \to \mathbb{R}$ be the cost function when parents choose effort τ, with $C(0) = 0, C'(0) = 0$, $C'(\tau) > 0$ for all $\tau > 0$, $C''(\tau) \geq 0$, and $\lim_{\tau \to 1} C'(\tau) = +\infty$. For analytical simplicity, we assume that all parents, irrespective of their type and group, have the same cost function. This assumption can easily be relaxed without affecting the main results of the paper.

Given a policy expectation π_t, a parent chooses the education effort $\tau \in (0,1]$ that maximizes

$$p_t V_g(\pi_t) + (1-p_t) V_b(\pi_t) - C(\tau) \tag{4}$$

where $p_t = \tau + (1-\tau) f(q_t)$ (see (1)). Therefore, given the cost $C(\tau)$, parents choose τ to maximize (4). All parents agree that the good trait is better than the bad one and are willing

to pay the cost $C(\tau)$ to provide effort τ. We obtain the following first order condition:

$$C'(\tau) = \frac{dp_t}{d\tau} V_g(\pi_t) - \frac{dp_t}{d\tau} V_b(\pi_t) \tag{5}$$

By substituting (1) in (5), we easily obtain the optimal education effort:

$$C'(\tau^*) = \Delta V(\pi_t)\left[1 - f(q_t)\right]$$

where $\Delta V(\pi_t) \equiv V_g(\pi_t) - V_b(\pi_t) \geq 0$. This implies that:

$$\tau^* = \tau\left(\Delta V(\pi_t)\left[1 - f(q_t)\right]\right) = C'^{-1}(\Delta V(\pi_t)\left[1 - f(q_t)\right]) \tag{6}$$

When, at time t, everybody in the neighborhood has trait g (i.e., $q_t = 1$) or when it does not pay to have a good work habit ($\Delta V(\pi_t) = 0$), then parents do not put any effort in transmitting the good trait g and thus $\tau^* = 0$. On the contrary, if, at time t, nobody in the neighborhood has good work habits ($q_t = 0$), then parents exert a positive effort to transmit trait g, provided that $\Delta V(\pi_t) > 0$. Finally, if parents expect that their offsprings will never be given a job, then it does not pay to have good work habits and $\tau^* = 0$. Note that the parents' decision depends on the society since parents have less incentive to socialize their children the easier it is for them to learn the good trait from society, namely the larger $f(q_t)$. To summarize, from (6), it is easily verified that τ^* increases with $\Delta V(\pi_t)$ but decreases with q_t. The latter is referred to as *cultural substitution* in Bisin and Verdier (2000, 2001).

4 Steady-state equilibrium

Following Hauk and Sáez-Martí (2002), we assume a Poisson birth and death process that keeps the population size of active workers constant. With probability λ an active worker will be active the next period. With probability $1 - \lambda$ an active worker in t has a child who becomes active in $t + 1$. We are now able to write the dynamics of q_t, the proportion of *good* workers at time t:

$$q_{t+1} = \lambda q_t + (1 - \lambda) q_t\, p_t + (1 - \lambda)\left(1 - q_t\right) p_t$$

The proportion of *good* workers at $t + 1$ is equal to the proportion of *good* workers who survived from period t (with probability λ) plus all new-born *good* children, i.e. the children born with *good* parents who adopt *good* work habits ($(1-\lambda) q_t\, p_t$) plus the children born with *bad* parents who adopt *good* work habits ($(1 - \lambda)\left(1 - q_t\right) p_t$). Observe that the probability

to adopt good work habits is independent of the parents' types since all parents value the "good" trait equally.[16] Using (1), we can rewrite this equation as:

$$\Delta q_t = (1-\lambda)\left[f(q_t) - q_t\right] + (1-\lambda)\tau_t^*\left[1 - f(q_t)\right] \tag{7}$$

where $\Delta q_t \equiv q_{t+1} - q_t$ and $\tau_t^* \equiv \tau\left(\Delta V(\pi_t)(1-f(q_t)\right)$, as given by (6). It is easily seen that Δq_t is increasing in τ_t^* for all $q_t \neq 1$, which means that the more parents invest in the good work habit, the higher is the proportion of good parents in the population.

Observe that when $\Delta V(\pi_t) = 0$, $\tau_t^* = 0$ and

$$\Delta q_t = (1-\lambda)\left[f(q_t) - q_t\right]$$

In that case, there are two stable rest points, at 0 and 1, and an unstable one at $q^* = \widehat{q}$. Note that if the peer transmission was *unbiased*, i.e. $f(q_t) = q_t$, then any value of q would be a steady state.

If $\Delta V(\pi_t) > 0$, $\tau_t^* > 0$, then

$$\Delta q_t > (1-\lambda)\left[f(q_t) - q_t\right]$$

for all $q_t < 1$. In that case, for large enough $\Delta V(\pi_t)$, $q^* = 1$ is the unique steady state. Otherwise, there were will be two stable steady states, $q^* = 1$ and $q^* = q^*(\Delta V) \in (0, \widehat{q})$, where $q^*(\Delta V)$ is the smallest q such that $\Delta q = 0$. Note also that under unbiased transmission ($f(q) = q$), all agents would have good work ethics in the long run and the only stable steady-state equilibrium would thus be $q^* = 1$. Figure 3 illustrates the dynamics of q_t, where the lower curve (solid line) corresponds to $\Delta V = 0$, and the curves above (in dotted lines) give the dynamics of q_t when ΔV increases. Since when the latter increases so does Δq_t, then for large enough ΔV, Δq_t is non negative for all q_t (upper curve).

[16] This is an important difference with Bisin and Verdier (2000, 2001) where each parent values more her type than the other type.

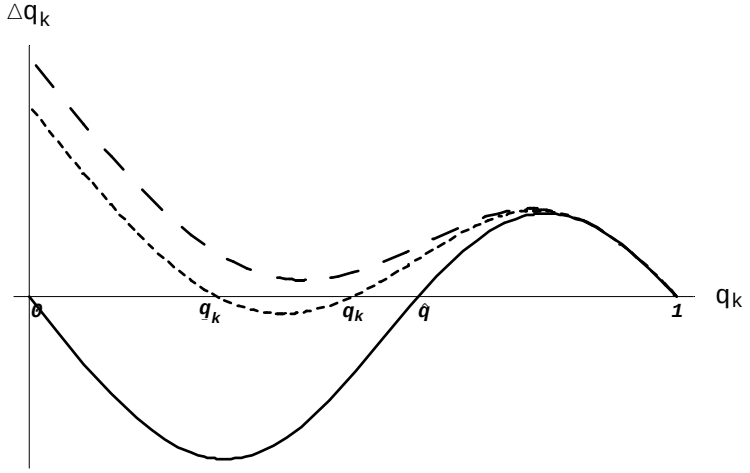

Figure 3: Dynamics of q_t.

In order to characterize the steady states of the economy, we need to compute the values parents attribute to their children. A parent, whose have a child at time t, needs to form expectations concerning the future employment status of her offspring (i.e. employers' future strategies). We denote by π_t the expectations parents form at time t.

Assume first that parents expect that their children will always be unemployed in the future, irrespective of their type, i.e. $c = \rho^p_\infty$. Then, $\Delta V(\rho^p_\infty) = 0$, parents put zero effort ($\tau^* = 0$), and consequently there are two stable rest points, at $q^* = 0$ and $q^* = 1$. If parents, instead, expect that some employers will employ seemingly *good* workers, then $\pi_t = (\theta\rho^p + (1-\theta)\rho^s)_\infty$, and for $\theta < 1$,[17]

$$\Delta V((\theta\rho^p + (1-\theta)\rho^s)_\infty) = \frac{(1-\theta)\alpha w}{(1-\lambda)} > 0 \tag{8}$$

In that case, $q^* = 1$ is always a steady-state equilibrium and, depending on the value of $\Delta V(\pi_t)$, there might be an interior stable steady state $q^*(\Delta V)$.

[17]Indeed, $V_i((\theta\rho^p + (1-\theta)\rho^s)_\infty)$ is the utility a parent attributes to her child of type $i = g, b$ when the expected job profile is $\theta\rho^p + (1-\theta)\rho^s)_\infty$. Because the duration of time individuals are active is $1/(1-\lambda)$, then

$$V_g((\theta\rho^p + (1-\theta)\rho^s)_\infty) = \frac{(1-\theta)w}{1-\lambda}$$

and

$$V_b((\theta\rho^p + (1-\theta)\rho^s)_\infty) = \frac{(1-\theta)(1-\alpha)w}{1-\lambda}$$

Indeed, when parents expect that their children will not benefit from good working habits, they do not exert any effort in transmitting the good trait, and peers determine the long run equilibrium. In that case, only $q^* = 0$ and $q^* = 1$ can be stable steady-state equilibria depending on the initial "quality" of the neighborhood in terms of work habits. When parents expect that their children will benefit from good work habits, they exert strictly positive effort to transmit the good trait and, in steady state, there will be more workers with good habits than otherwise. This is why a third interior stable steady state $q^*(\Delta V)$ may emerge.

The equilibria that will be reached in the long run depend on the initial conditions, parents' expectations and firms' behaviors. We assume that all-non discriminating employers maximize profits in each period and that parents have *rational expectations.*[18]

Definition 1 *Assume that $q_t = q^*$ and that the proportion of prejudiced employers is θ. Then, q^* is a stable steady state under rational expectations and profit maximizing behavior if and only if:*

(*i*) *Firms maximize profit: All non-prejudiced employers choose $\rho_t = \mu(q^*)$ for all $t > t_0$, while the prejudiced employers choose $\rho_t = \rho^p$ for all $t > t_0$.*

(*ii*) *Rational expectations:*

$$\pi_t = \{(1-\theta)\mu(q^*) + \theta\rho^p\}_{t+1}^{\infty} \tag{9}$$

(*ii*) *Stability: $\Delta q^* = 0$ and at q^*, $\partial \Delta q / \partial q < 0$.*

Let $E(\theta)$ be the set of stable steady states under rational expectations when the proportion of prejudices employers is θ. We have:

Proposition 1 *Assume that $f(q) \gtreqless q$ for $q \gtreqless \widehat{q}$ for some $\widehat{q} \in (0,1)$. Then,*

(*i*) *$\{0,1\} \subseteq E(\theta)$ for all θ.*

(*ii*) *$q^*(\Delta V((\theta\rho^p + (1-\theta)\rho^s)_\infty)) \in E(\theta)$ whenever $q^*(\Delta V((\theta\rho^p + (1-\theta)\rho^s)_\infty)) \geq \widetilde{q}$.*

[18] Definition 1 and Proposition 1 are valid for both minority and majority workers since the analysis of the latter is a special case of the former when $\theta = 0$.

Proof. If parents expect that their children will never be given a job, i.e. $\pi_t = \rho^p_\infty$, then $\Delta V(\rho^p_\infty) = 0$ and $\Delta q = (1-\lambda)[f(q) - q]$. In that case, the only two stable steady-state equilibria are $q^* = 0$ and $q^* = 1$.

If parents expect $(\theta\rho^p + (1-\theta)\rho^s)_\infty$, then $\Delta V > 0$. In that case, $q^* = 1$ is always a steady-state equilibrium under rational expectations and so is $q^*(\Delta V)$ provided that $\widetilde{q} \leq q^*(\Delta V)$, since it is in the interest of the non-prejudiced employers to use the screening assignment and expectations are rational. ∎

Figure 4 illustrates Proposition 1 where stable steady states are displayed by squares. The solid line are the dynamics when parents expect the pooling assignment (ρ^p_∞) while the dashed line is when parents' expectations are: $(\theta\rho^p + (1-\theta)\rho^s)_\infty$. The interior equilibrium cannot be sustained when parents expect (ρ^p_∞) since, in that case, they put not effort, i.e. $\tau^* = 0$. As a result, in that case, the dynamics of q_t is only driven by peer effects, and, because of frequency-dependent bias, in steady-state, either everybody end up with bad work habits or good work habits. It is the initial quality of the neighborhood that decides the equilibrium value of q^*. When parents expect $(\theta\rho^p + (1-\theta)\rho^s)_\infty$, then everything depends on θ, the fraction of prejudiced employers. In the upper panel of Figure 4, the fraction θ of prejudiced employers is high and interior values of q cannot constitute a stable steady-state equilibrium. In the lower panel, θ has a lower value and therefore a stable interior equilibrium $q^*(\Delta V)$ can be sustained in steady-state.

In this model, the set of steady states under rational expectations, $E(\theta)$, is either $\{0, 1\}$ or $\{0, q^*(\Delta V), 1\}$. When θ, the proportion of discriminating employers is high enough, there cannot be an equilibrium where the non-prejudiced employers follow the screening assignment. Indeed, if parents expect the non-prejudiced employers to offer their children the screening contract, the economy would converge to a state where $\underline{q}(\theta) < \widetilde{q}$, for which the screening assignment would not be optimal (see equation (2)).

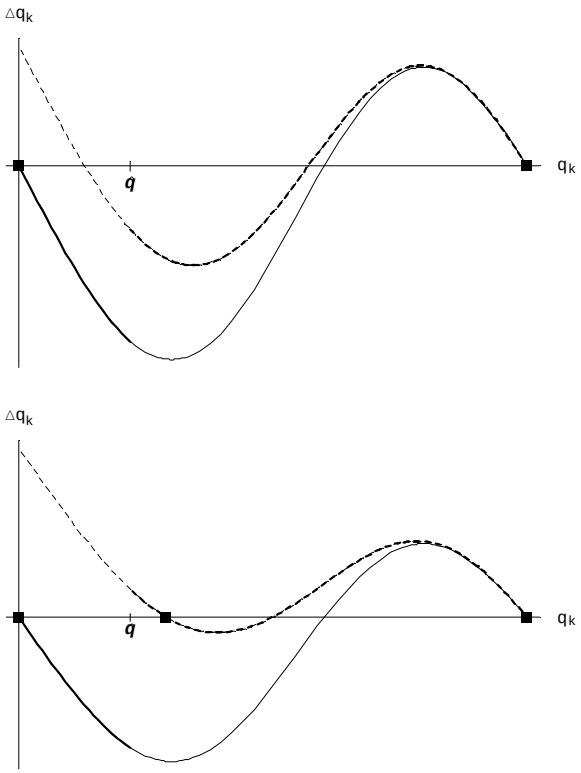

Figure 4: Stable steady-state equilibria under rational expectations

Observe that, since q_t varies over time, the employers' strategy can switch over time (for screening to pooling or vice versa). However, because of rational expectations, this switching strategy has to be "rational" for the firms, i.e. it has to be that it is profit maximizing for non-discriminating firms to switch strategies. Assume, for example, that parents anticipate that, at time $t = 0, 1, ..., 19$ up to period $T = 20$, the non-prejudiced firms will follow the screening policy and then from period $T = 20$ onwards the pooling policy will be optimal for these firms. If parents invest on τ according to these (non-stationary) expectations, the dynamics generated by (7) are such, at time T, the employers optimally change their policy, namely expectations are rational. The results of Proposition 1 on stable steady-state equilibria are still valid even if firms switch their optimal strategy over time.

Let us now interpret our model in terms of two groups, the majority group (i.e. whites) for which $k = M$, and the minority group (i.e. blacks) for which $k = m$. For the majority group, $\theta = 0$ and therefore depending on parents' expectations and on initial neighborhood quality, each of 0, $q^*(\Delta V)$ and 1 can be a stable steady-state equilibrium. For the minority

group, the equilibrium outcome depends on parents' expectations and initial neighborhood quality but also on the percentage θ of prejudiced employers. As a result, the two different groups may end-up in very different steady states depending on discrimination and different strengths of their peer groups. Figure 5 illustrates how different values of θ can lead to very different long-run outcomes for black and white workers. The uppest curve represents the dynamics for $\theta = 0$, the lowest one for $\theta = 1$, and the middle one for an intermediate value of θ. It is easy to see that for the same initial conditions, the economy may converge to very different states. For whites, $\theta = 0$, and they end up in steady-state with a large fraction of them having good work habits (either q_M^* is interior or $q_M^* = 1$). In other words, there is no equilibrium in which all whites have bad habits because parents rationally anticipate that their children will always be given a job. For blacks, $\theta \geq 0$, and the outcomes depend on the percentage of discriminating employers θ and the initial condition. If $\theta = 1$ (all employers discriminate against blacks and never employ them), then if the initial neighborhood has enough individuals with bad work habits, all black workers will have bad work habits in equilibrium, i.e. $q_m^* = 0$. When θ decreases, there is less discrimination against blacks, and depending on the neighborhood where they live, a more or less large fraction of blacks can end up having good work habits.

To summarize, when discrimination prevails, it is less likely that blacks have good work habits, especially if they live in segregated neighborhoods where most of their peers have also bad work habits. Indeed, if the fraction of prejudiced employers is high enough, their beliefs are always self-fulfilled. In steady-state, the work habit of minority workers is (on average) *bad* and the profit maximizing strategy is not to give them jobs. Due to the worse opportunities their children are going to face, minority parents do not find worthwhile exerting effort to transmit "good" values. As a result, more minority workers have bad work habits. This, in turn, influences members of the next generations in the same community and the initial negative beliefs are confirmed in steady state.

This mechanism could explain why some (inner-city) neighborhoods are populated by people having bad working habits (the "ghetto culture" mentioned in the Introduction). This may be the result of a combination of discrimination, low investment in work ethic from parents and bad peers.

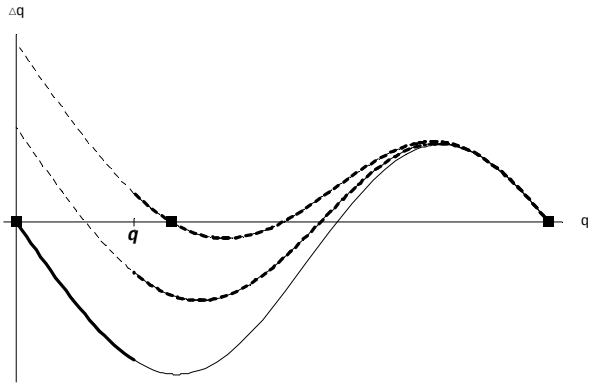

Figure 5: Black and white outcomes

In the next section, we study the effect of policies that can break down this vicious cycle of negative attitudes and behaviors that lead to unemployment and bad working habits among minority workers.

5 Affirmative Action and integration policies

5.1 Affirmative Action

Let us start by considering an affirmative-action policy that consists in giving a preferential treatment to discriminated groups, for example, by imposing minimum hiring quotas to firms.[19]

Let us focus on minority workers. Assume that $q_m = 0$ (all workers of the community are unemployed and have bad work habits) and that *all* employers (prejudiced and non-prejudiced) are forced to hire a proportion ϕ of minority workers (*first Affirmative Action policy*). This policy will have an effect on the proportion of good workers only if it changes the parent's evaluation of the traits. Since employment possibilities are independent of type, i.e., both types get the same expected wage, then $\Delta V = 0$, and this Affirmative Action policy will have no effect on parents' incentives.

Consider now an Affirmative Action policy that requires the screening assignment for a quota ϕ of workers (*second Affirmative Action policy*). In other words, all firms, including

[19]For an overview and evaluation on Affirmative Action policies in the United States, see Holzer and Neumark (2000, 2006).

the prejudiced ones, are obliged to treat a proportion ϕ of minority workers the same way they treat majority workers, namely use with them the screening policy.[20] If parents expect this policy to be implemented, then they will exert positive effort if

$$\Delta V = \phi \frac{\alpha w}{(1-\lambda)} > 0$$

and this policy has the potential to be effective since good workers have a higher probability of being employed.

Assume now that the first policy is introduced when $q_t = q^*(\Delta V) > \widetilde{q}$, where $\widetilde{q}$ is defined in (2). In that case, parents' evaluation of the trait is:

$$\Delta V = \frac{(1-\phi)(1-\theta)\alpha w}{(1-\lambda)}$$

Note that this value is smaller than $\Delta V((\theta_k \rho^p + (1-\theta_k)\rho^s)_\infty)$ (see (8)) and this policy has a negative effect since it reduces the equilibrium value of good workers. The second policy, instead, will have a positive effect because it increases the value of a good child relative to the case without intervention, i.e.,

$$\Delta V(\pi_t^k) = \frac{(1-\theta+\phi\theta)\alpha w}{(1-\lambda)} > \Delta V((\theta_k \rho^p + (1-\theta_k)\rho^s)_\infty) = \frac{(1-\theta)\alpha w}{(1-\lambda)}$$

Without the Affirmative Action policy, all non-prejudiced employers employ seemingly *good* workers and this gives an advantage to the *good* workers (since *bad* workers are detected with positive probability). Under the first Affirmative Action policy, the advantage of being "good" is smaller and, as a result, parents put less effort. If, when the policy is introduced, the state of the economy is close enough to $\widetilde{q}$ or/and ϕ is high enough, the economy will converge to the *worst* steady state (i.e. $q_m^* = 0$). Instead, when the second policy is implemented, a larger share of workers are automatically screened and the return is higher for *good* workers.

Our results are related to that of Coate and Loury (1993). In their paper, Affirmative Action is modeled as a government-mandated constraint on employers, requiring them to

[20] The main difference between these two Affirmative Action policies is that, in the first one, employers are obliged to hire ϕ% of their workers from the minority group but *cannot* test them. So whether the worker is "good" or "bad" is irrelevant in the employment process and "good" and "bad" workers have the same chance to be hired. In the second Affirmative Action policy, employers are still obliged to hire ϕ% of their workers from the minority group but *can* test them. As a result, only "good" workers and seemingly "good" workers with bad work habits will be hired.

assign workers from each group to more rewarding jobs at the same rate. Affirmative action may sometimes fail because employers, to comply with the Affirmative-Action policy, must lower their standard for assigning the workers, for whom they have negative views about, to good jobs. Lowering the standard may reduce investment incentives because the favored workers see themselves as likely to succeed without acquiring the relevant skills. Thus employers' negative stereotypes can continued to be confirmed in equilibrium under Affirmative Action. Coate and Loury show that this equilibrium is more likely to exist if the proportion of these workers is relatively rare in the population. Even if the mechanism is different, this result is close to ours when the first Affirmative Action policy is implemented. In our case, compared to the equilibrium without affirmative action, parents put relatively less effort in transmitting the good trait because a fraction of workers, irrespective of their type, are sure to be employed. Our conclusion is that only the second policy should be implemented because it gives the right incentives to parents to transmit good working habits to their children.

5.2 Integration

Racial integration is a very sensitive and highly debated policy in the United States.[21] Programs like, for example, the Moving to Opportunity" (MTO) program aims at moving very poor households to richer areas.[22] Our model can shed some light on this controversial debate.

Assume now that workers from different groups interact with each other and let σ_k denote

[21] For instance, in 1974, federal judge W. Arthur Garrity ordered to integrate Boston's schools through forced busing (black kids were driven by bus to white schools). Twenty five years after, in june 1999, facing pressure from a lawsuit by white parents and advocates of neighborhood schools, the city's school board voted 5-2 to stop the busing policy and to adopt a race-blind admissions policy starting in September 2000 (Education Week, 08/04/99 edition, by Caroline Hendrie).

[22] By giving housing assistance (i.e. vouchers and certificates) to low-income families, the MTO programs help them to relocate to better and richer neighborhoods. The results of most MTO programs (in particular for Baltimore, Boston, Chicago, Los Angeles and New York) show a clear improvement of the well-being of participants and better labor market outcomes (see, in particular, Ladd and Ludwig, 2001, Katz et al., 2001, Kling et al., 2005, Rosenbaum and Harris, 2001). Observe that the MTO programs are not targeted on minority families (such as blacks) by rather on poor families. But since the two are correlated, this is a good example of an integration policy.

the proportion of individuals of the other group among the peers.[23] Now the dynamics of group $k = m, M$ are given by:

$$\Delta q_t^k = (1-\lambda)\left[f((1-\sigma_k)q_t^k + \sigma_k q_t^j) - q^k + \tau^{k*}(1 - f((1-\sigma_k)q_t^k + \sigma_k q_t^j))\right] \qquad (10)$$

where the subscript j denotes the other group. It is easy to see that

$$\frac{d\Delta q_t^k}{d\sigma_k} \gtreqless 0 \text{ whenever } q_t^j \gtreqless q_t^k.$$

The effect of mixing families is to increase the proportion of *good* workers in the population that has a lower proportion of them (say blacks), and to decrease its proportion in the other population (say whites). In other words, if white families have better work habits, then blacks will benefit from this policy since it will increase the percentage of black people with good work habits in the neighborhood but whites will suffer from it since they will be more expose to families with bad work habits. This result could explain why the different integration policies implemented in the US and in Europe[24] seem to have small effects because of the possible negative effect on the white population. Indeed, mixing policies, which include school busing, forced integration of public housing, and laws barring discrimination in housing and employment,[25] have often had limited effects and are even being at times opposed by the majority groups in whose interest they have been pursued (see e.g., Jacoby, 1998, and Thernstrom and Thernstrom, 2002).

Interestingly, Chaudhuri and Sethi (2008), who incorporate neighborhood effects into an otherwise standard statistical discrimination model, find a similar result, even though the mechanism is totally different. In their paper, increasing integration tends to lower the costs of human acquisition for B-workers while raising these costs for A-workers. Thus, if integration proceeds far enough, the authors show that negative stereotypes cannot be sustained.

[23] In our framework, intermediate value of σ_k mean that blacks and whites live together. For example, in 1979, the average black lived in a neighborhood that was 63.6% black, even though blacks formed only 14.9% of the population (Borjas, 1998, Table 1). This means here that $\sigma_m = 0.364$.

[24] For instance, the creations of Zones of Educational Priority (ZEP) and the rehabilitation of bleak housing projects in immigrant neighborhoods under the guise of urban policy ('politique de la ville') in France had very limited effects. See, for example, Benabou et al. (2009) for an evaluation of the ZEP and Brubaker (2001) who compares the different ways of assimilating ethnic minorities in France, Germany, and the US.

[25] See Lang (2007) for an overview of these policies in the U.S.

Guryan (2004) shows that the desegregation plans that have been implemented in American schools for the last forty years, have mainly benefited the black students by reducing their high school drop out rates while they had no effect on the dropout rates of the other students. Peer effects are shown to be one of the main explanations of this result. Studying the Metco program, a long-running desegregation program that sends mostly Black students out of the Boston public school district to attend schools in more affluent suburban districts, Angrist and Lang (2004) find similar results.[26]

6 Concluding remarks

We have introduced a dynamic model of cultural transmission to explain different outcomes for minority and majority workers. We have shown that if the proportion of taste-based prejudiced employers is high enough, prejudices can be confirmed in equilibrium. Otherwise, multiple equilibria exist, with and without discrimination. We have also studied different policies aiming at reducing discrimination. Both Affirmative Action[27] and integration policies may work. The mechanisms through which these two policies affect the quality of the workers are different, though. Affirmative action policies directly affect the expected payoff of the different types of workers and the parents' incentives to invest on those traits. By "improving" the quality of the peers black children interact with, integration policy has a positive effect on those workers with worse peer group. The opposite happens for the other children since, after integration, they interact with a "worse" quality peer group. From a political economy perspective, it is likely that all workers will support the Affirmative Action policy while only families from bad neighborhoods may favor the integration policy. As far as employers are concerned, it seems plausible that they may object to Affirmative Action policies that impose too small quotas. The reason for this opposition is that they are forced to offer contracts that are suboptimal given the average composition of workers. When the Affirmative Action quotas are high enough, both employers and workers benefit from the policy.

[26] There is also a growing literature in the fields of public finance, development and urban economics that shows that investments in public goods, tastes for redistribution, and other forms of civic behavior are less common in racially or ethnically diverse communities (see, in particular, Alesina et al., 1999, Alesina and La Ferrara, 2000, Luttmer, 2001, Vigdor, 2004).

[27] In this discussion, we only focus on the second Affirmative Action policy.

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